

SPECIFICATION

TITLE: AUXILIARY EYEWEAR ATTACHMENT METHODS AND APPARATUS

BACKGROUND OF THE INVENTION

1. Field of the Invention

This invention relates to auxiliary eyewear attachment methods and apparatus, such as clip-on eyewear, and more particular relates to an auxiliary eye wear for attaching auxiliary sunglasses to conventional eyeglasses.

2. Background Information

Auxiliary eyewear to convert conventional eyeglasses to sunglasses are very popular. They allow the user to usually avoid the need for two separate prescription lenses. They can also be used, but less frequently, to attach auxiliary eyewear that can change the prescription of lenses. The more common use, however, is to add tinted lenses to conventional eyeglasses.

A number of different designs are available for auxiliary eyewear including clip-on eyewear, as well as auxiliary eyewear attachment using magnets. One method of attaching auxiliary eyewear is by clips. A method of attaching auxiliary eyewear by clips is shown and described in U.S. Application No. 08/510,797 filed August 3, 1995 to the same inventor as the invention disclosed herein and incorporated herein by reference. Another patent describing a clip-on type of sunglasses is disclosed and described in U.S. Patent No. 5,696,571 issued December 9, 1997

Express Mail Label Number: EV393635038US

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Date: January 22, 2004

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1 to Spencer et al. In these devices auxiliary eyewear is
2 fastened to eyeglasses by a conventional clip system with one
3 clipping engaging the temple while other clips engage the
4 conventional frame.

5 A newer and very popular method of attaching eyeglasses is
6 by using magnets. One such method is disclosed and described in
7 U.S. Patent No. 4,070,105 of Meeker. In the Meeker patent the
8 conventional frame includes a magnetic material secured around
9 the peripheral portion facilitating attachment of auxiliary
10 eyeglasses to the conventional eyeglass frame.

11 Another method of attaching auxiliary eyeglasses using
12 magnets is disclosed in U.S. Patent No. 5,416,537 of Sadler
13 having magnets secured to temporal portions of a conventional
14 frame that mate with similar magnets in auxiliary eyeglass
15 frames. In the Meeker and Sadler patents the magnets are
16 embedded in portions of the frames in a vertical orientation for
17 mating with similar magnets in the auxiliary eyeglasses. A
18 problem with this type of arrangement is that the auxiliary
19 eyeglasses are held in place in front of the conventional
20 eyeglasses only by the strength of the magnets. There are no
21 supporting members to prevent the auxiliary eyeglasses from
22 moving vertically relative to the conventional eyeglass frame.
23 Therefore, when the auxiliary eyeglasses are used in some
24 strenuous activity such as jogging or exercising they can slide
25 off and become detached from the conventional frame.

26 A design that solves this problem by having magnets in

1 auxiliary eyeglass extensions is disclosed and described in U.S.
2 Patent No. 5,568,207 of Chao. In this patent the problem of the
3 eyeglasses sliding vertically and coming off the conventional
4 eyeglasses is solved by extensions on the auxiliary eyeglasses
5 having magnets that extend over (i.e. above) hinge connections
6 for the temples of the conventional eyeglasses. Magnets in the
7 hinge connections mate with magnets in the extensions to hold
8 the utility eyeglasses in place in front of the conventional
9 eyeglasses. The extensions fitting over (i.e. above) the hinge
10 portions of the conventional eyeglasses prevent the frames from
11 moving downward. It was thought that this combination of the
12 extension being above the temple connection in combination with
13 the magnet prevents the auxiliary eyeglasses from moving
14 downward relative to the conventional eyeglasses and being
15 dislodged during strenuous activity. That is, the patent
16 describes the prior art as being unable to provide a practical
17 solution to attaching auxiliary eyeglasses to conventional
18 eyeglasses with magnets alone.

19 The problem with the eyeglasses disclosed and described in
20 U.S. Patent No. 5,568,207 is that the auxiliary eyeglass
21 extensions must be carefully placed above the temple hinge
22 connections. This makes it little more difficult to attach the
23 auxiliary frames to be sure that the extensions are placed
24 carefully above the hinge connections of the conventional
25 eyeglass. In most cases a wearer has to remove his conventional
26 eyeglasses to attach the auxiliary lenses.

1 It is, therefore, one object of the present invention to
2 provide an improved method and apparatus for attaching auxiliary
3 eyeglasses to conventional eyeglasses.

4 Another object of the present invention is to provide an
5 improved method and apparatus for attaching auxiliary eyeglasses
6 to conventional eyeglasses with magnets alone without any need
7 for other support.

8 Yet another object of the present invention is to provide a
9 method of attaching auxiliary eyeglasses to conventional
10 eyeglasses by appendages having magnets which fit below and mate
11 with similar magnets in the conventional eyeglass extensions for
12 attaching eyeglass temples.

13 Still another object of the present invention is to provide
14 an improved magnetic attachment of auxiliary eyeglasses to
15 conventional eyeglasses with magnets that are oriented to
16 maximize the magnetic force to prevent vertical or downward
17 movement of the auxiliary eyeglasses.

18 Still another object of the present invention is to provide
19 an auxiliary eyeglass magnetic connection having magnets that
20 are oriented horizontally to maximize the magnetic force in the
21 vertical direction.

22 Still another object of the present invention is to provide
23 an auxiliary eyeglass magnetic attachment that includes
24 additional supporting clips, if desired.

25 Yet another object of the present invention is to provide
26 auxiliary eyeglass magnetic attachment that includes a clip that

1 conveniently fits over the bridge of conventional eyeglass
2 frame.

3 BRIEF DESCRIPTION OF THE INVENTION

4 The purpose of the present invention is to provide an
5 improved auxiliary eyeglass attachment method and apparatus that
6 has a secure attachment by use of magnets that effectively
7 prevents the auxiliary eyeglasses from becoming detached from
8 the conventional eyeglass without a need for additional support.

9 In the preferred embodiment of the invention the auxiliary
10 eyeglasses are attached to conventional eyeglasses by magnets in
11 a manner that prevents any downward or vertical movement that
12 might cause the auxiliary eyeglasses to become detached. The
13 method of attaching with magnets disclosed herein also provides
14 a much easier method of securing the auxiliary glasses to the
15 conventional eyeglasses as will be described in greater detail
16 hereinafter.

17 It was thought, for example, as disclosed in the patent of
18 Chao, Patent No. 5,568,207, that some support was needed to
19 prevent the auxiliary eyeglasses from "moving downward" and
20 coming off the conventional eyeglasses. However, what was not
21 recognized was that magnets have a very strong attraction in a
22 direction perpendicular to their axis. That is, with very
23 strong magnets it is difficult to separate them by pulling them
24 straight apart. Usually to separate them, particularly when
25 they are very strong magnets, is to slide them in a direction
26 parallel to their mating surfaces. The reason for this is that

1 the magnetic force is stronger in a direction perpendicular to
2 the surface (i.e. the poles) of the magnets than it is to a
3 direction parallel to the surface. The inventor of the
4 auxiliary eyeglasses disclosed herein discovered that because of
5 this principle correctly oriented magnets can securely hold
6 auxiliary eyeglasses on conventional frames without the need for
7 additional support. The key is to orient the magnets so that
8 any vertical force applied to the auxiliary frames will be
9 perpendicular to the plane of the magnets.

10 To achieve this unique construction appendages on opposite
11 sides of the auxiliary frames include a socket for receiving
12 magnets that are oriented with the plane of the magnets
13 horizontal and the axis (i.e. poles) vertical or parallel to the
14 auxiliary eyeglass frame. Complementary mating magnets are
15 mounted in sockets on the hinge extensions on the conventional
16 eyeglasses which are also oriented with the plane of the magnets
17 horizontal and their axis (i.e. poles) vertical or approximately
18 parallel to the plane of the conventional eyeglass.

19 This arrangement means the auxiliary eyeglasses may be
20 easily mounted on the conventional eyeglasses without any
21 fumbling or searching. The user doesn't have to feel with your
22 fingers or remove the eyeglasses to be sure that the auxiliary
23 eyeglass appendages are carefully aligned over the temple
24 mounting extensions as with the arrangement described in U.S.
25 Patent No. 5,568,207 referred to hereinabove. You simply place
26 the auxiliary eyeglasses against the conventional eyeglasses

1 with a slight upward motion and they easily attach when the
2 magnets come into close proximity. This arrangement makes for a
3 securely attached auxiliary eyeglasses and frame that is simple
4 and easy to use without the difficulties with the other
5 auxiliary eyeglass designs.

6 One can easily see the auxiliary eyeglasses approaching the
7 conventional eyeglasses with the appendages on the auxiliary
8 eyeglasses below the temple of the conventional eyeglass frame.
9 Then with a very slight upward movement the magnets attract and
10 the auxiliary eyeglass frame is firmly attached. This can be
11 done simply and easily with one hand without any feeling or
12 fumbling that previous arrangements required. The orientation
13 is nearly automatic and doesn't require the more careful
14 alignment that is required of other magnetically fastened
15 auxiliary eyeglasses.

16 In an optional but less preferred embodiment, clips can
17 provide additional support if desired. This, for example,
18 might be used where very small magnets are used to attach
19 the eyeglasses to the frames. In this embodiment a combination
20 of the clip shown and described in applicant's prior Application
21 Serial No. 08/510,797 filed August 3, 1995 or similar to that
22 shown in the other patents can be attached to the auxiliary
23 eyeglass frame. A clip would be incorporated into the bridge of
24 the auxiliary eyeglass frame which would fit over and engage the
25 conventional eyeglass bridge. This would lock the auxiliary
26 eyeglass frame on the conventional eyeglass frame with the

1 magnets holding the sides in place.

2 In still another optional but less preferred embodiment, a
3 magnet could be provided beneath the bridge of a conventional
4 eyeglasses to mate with a similar magnet on top of the bridge of
5 the auxiliary eyeglass frame. In this embodiment clips would be
6 attached on top of or in the temple region of the auxiliary
7 eyeglass frame that would fit over and engage the conventional
8 eyeglass frame. In this embodiment the auxiliary eyeglass would
9 be mounted by sliding the clips over the conventional eyeglass
10 frame then pushing down on the bridge so that the magnet on the
11 bridge slides under the bridge of the conventional eyeglass
12 frame mating the magnets. The magnets in the bridge hold the
13 auxiliary eyeglasses onto the frame of the conventional
14 eyeglasses with the clips securely locking it in place.

15 The above and other novel features of the invention will be
16 more fully understood from the following detailed description
17 and the accompanying drawings, in which:

18 BRIEF DESCRIPTION OF THE DRAWINGS

19 Figure 1 is an isometric view illustrating the method and
20 apparatus for attaching an auxiliary eyeglass frame to
21 conventional eyeglasses with magnets alone.

22 Figure 2 is an isometric view illustrating the auxiliary
23 eyeglass frame attached to a conventional eyeglass frame with
24 magnets alone.

25 Figure 3 illustrates the connection of the auxiliary
26 eyeglass frame by magnets embedded in an appendage mating with

1 similar magnets embedded in the temple extension of a
2 conventional eyeglass frame.

3 Figure 4 illustrates an optional embodiment in which a clip
4 formed on the bridge of the auxiliary eyeglass frame fits over
5 and engages the bridge on the conventional eyeglass frame.

6 Figure 5 shows the embodiment of Figure 4 mounted on a
7 conventional eyeglass frame.

8 Figure 6 is a sectional view taken at 6-6 of Figure 5.

9 Figure 7 is another embodiment in which magnets are
10 embedded in the bridge of the auxiliary eyeglass frame for
11 mating with magnets mounted beneath the bridge of a conventional
12 eyeglass frame and including clips for locking the auxiliary
13 eyeglass frame onto the conventional eyeglass frame.

14 Figure 8 illustrates the method of mounting the auxiliary
15 eyeglass frame of Figure 7 on a conventional eye glasses.

16 Figure 9 illustrates the embodiment of Figure 7 with the
17 auxiliary eyeglass firmly secured on a conventional eyeglass
18 frame.

19 Figure 10 is a sectional view taken at 10-10 of Figure 9.

20 DETAILED DESCRIPTION OF THE INVENTION

21 A unique method and construction for attaching auxiliary
22 eyeglasses 10 to conventional eyeglasses 12 is illustrated in
23 Figures 1 through 3. Auxiliary eyeglasses 10 are most commonly
24 tinted eyeglasses to convert conventional eyeglasses 12 to
25 sunglasses but also can have different prescription lenses.
26 Auxiliary eyeglasses 10 has lenses 14 mounted in a frame 16

1 having appendages 18 extending rearward on either side of frame
2 16. Conventional eyeglasses 12 have a frame 20, lens 21 and a
3 bridge with temple extensions 22 on either side of frame 20 for
4 attaching temples 24 to the frames.

5 In the auxiliary eyeglasses of the prior art magnets are
6 either embedded in frame 20 or in extension on auxiliary
7 eyeglasses that extend over or above the temple extensions 22 of
8 the eyeglass frame 20. With the prior art constructions of
9 magnets embedded in frames 20 the plane of the magnets is
10 vertical or parallel to the lenses facilitating detachment of
11 the auxiliary eyeglasses by a downward shearing force. To solve
12 this problem the auxiliary eyeglasses of U.S. Patent No.
13 5,568,207 proposed putting magnets in auxiliary eyeglass
14 extensions that fit over or above the temple mounting extensions
15 on the eyeglass frame. It was thought that some support in
16 addition to the magnets was needed to prevent the auxiliary
17 eyeglasses from becoming detached. While this is a satisfactory
18 solution it is not the best solution. The auxiliary eyeglasses
19 must be carefully positioned above the conventional eyeglass
20 frame to be sure the extensions are above the temples.

21 The present invention not only provides a solution to the
22 potential detachment or dislodging of auxiliary eyeglass frames
23 10 but simplifies the method of mounting the auxiliary eyeglass
24 with minimum fuss. This is achieved by inserting magnets 26 in
25 sockets 28 in appendages 18 attached to auxiliary eyeglass frame
26 16. Complementary magnets 30 are mounted in sockets 32 attached

1 to conventional eyeglass frame 20 temple extensions 22.

2 Preferably magnets 26 and 30 are at least four millimeters (4
3 mm) in diameter.

4 An important and critical feature of the invention is the
5 orientation of magnets 26 and 30, which is shown more clearly in
6 sectional view of Figure 3. Generally magnets have plane
7 surfaces and axis. In this case magnets 26 and 30 are shown as
8 cylindrical having an axis 34 that is vertically oriented and is
9 approximately parallel to auxiliary frame 16 and conventional
10 eyeglass frame 20. This means the maximum magnetic attractive
11 force is vertically oriented along axis 34. Accordingly the
12 maximum magnet force of magnets 26 and 30 is vertically oriented
13 to resist dislodging of auxiliary eyeglass frame 10 by a
14 downward movement. It was found that by mounting magnets 26 and
15 30 approximately 4 mm in diameter having a strong magnetic force
16 vertically oriented is sufficient to hold auxiliary eyeglass
17 frame 10 in place and prevent downward movement. Thus,
18 auxiliary eyeglass frame 10 is securely mounted on conventional
19 eyeglasses 12 and will not easily dislodged by strenuous
20 activity occurring in sports or exercising.

21 Shearing forces along interface 36 are minimal and would
22 more likely cause conventional eyeglasses 12 to fall off the
23 wearer before auxiliary eyeglasses 10 would be dislodged. This
24 construction not only improves the attachment of auxiliary
25 eyeglasses 10 but also makes it easy for them to be mounted as
26 illustrated in Figure 2. Auxiliary eyeglasses 10 can merely be

1 brought up to conventional eyeglasses 12 with a slight upward
2 motion until magnet 26 is attracted to magnet 30 and locks in
3 place. Thus, they can easily be oriented and mounted on
4 conventional eyeglasses 12 without the need to remove
5 conventional eyeglasses from the wearer.

6 An optional but less preferred embodiment is illustrated in
7 Figures 4 through 6. In this embodiment auxiliary eyeglasses
8 10' have appendages 18 with magnets 26 installed in sockets 28
9 as before. Magnets 26 mate with magnets 30 mounted in sockets
10 32 on conventional temple extensions 22 on conventional eyeglass
11 frame 20 as before. However, to provide additional security and
12 hold auxiliary frame 10' on conventional eyeglass frame 20,
13 bridge 38 of auxiliary eyeglass frame 40 is formed with a clip
14 42 constructed to extend over and mount on conventional eyeglass
15 bridge 44. Clip 42 will provide additional support for
16 auxiliary eyeglasses 10' for use in extremely strenuous
17 activity, for example, in cases where sports activities are such
18 that conventional eyeglasses 12 are secured to the head of the
19 wearer with straps that wrap around the back of the head. As
20 shown in Figure 6 clip 42 formed on auxiliary eyeglass bridge 38
21 fits securely over bridge 44 on conventional eyeglass frame 20.

22 To mount the auxiliary eyeglasses 10' of Figure 4, they are
23 placed against the conventional eyeglasses 12 and slid gently
24 upward until magnet 26 mates with magnet 30. Clip 42 formed in
25 bridge 38 of auxiliary frame 40 is then slipped over a
26 conventional eyeglass bridge 44 securely mounting eyeglasses 10'

1 on conventional eyeglasses 12.

2 Another embodiment utilizing the combination of magnets and
3 clips to securely mount auxiliary eyeglasses on conventional
4 eyeglasses is illustrated in Figure 7 through 10. In this
5 embodiment auxiliary eyeglasses 50 are formed with clips 52
6 mounted on the eyeglass frame 54 on the upper quadrant of the
7 frame. Magnets 56 are secured in bridge 58 joining auxiliary
8 eyeglass lenses 60. Conventional eyeglasses 62 are formed with
9 frame 64 having a bridge 66 having complementary magnets 68
10 mounted in the bridge. In this embodiment auxiliary eyeglasses
11 50 are mounted on conventional eyeglasses 62 by the combination
12 and opposing forces of clips 52 fitting over frame 70 of
13 conventional eyeglasses 62 and bridge 58 fitting beneath bridge
14 66 so that magnets 56 in bridge 66 mate.

15 The installation of auxiliary eyeglasses 50 on conventional
16 eyeglasses 62 is illustrated in Figures 8 and 9. Clips 52 on
17 the upper quadrant of auxiliary lens frame 54 fit over
18 conventional eyeglass frame 70 as shown in Figure 8. Auxiliary
19 eyeglass bridge 58 is sufficiently flexible that bridge 58 can
20 be pushed beneath bridge 66 on conventional eyeglass frame 62
21 allowing magnets 56 to mate with magnets 68 embedded in
22 conventional eyeglass bridge 66. Thus, auxiliary eyeglasses 50
23 are securely mounted on conventional eyeglasses 62 as
24 illustrated in Figure 9 and held in place by the opposing forces
25 of clips 52 and magnets 56 and 68. Again, this construction
26 would perhaps be best where extremely strenuous activity is

1 involved that requires conventional eyeglasses 62 to be secured
2 on the head of the wearer with a strap.

3 However, for most sports activities and exercising the
4 construction disclosed and described with respect to Figures 1
5 through 3 is sufficient to mount auxiliary eyeglasses 10 on
6 conventional frames 12. The key feature here is the orientation
7 of magnets 26 and 30 so that the maximum magnetic attractive
8 force along their axis (i.e. poles) 34 is vertically oriented or
9 parallel with conventional eyeglass frame 20. In most cases
10 only a substantial shearing force parallel to the interface 36
11 between magnets 26 and 30 could dislodge auxiliary eyeglasses 10
12 but then that force would probably dislodge conventional
13 eyeglasses 12 from the head of the wearer.

14 Thus there has been disclosed novel and unique methods for
15 attaching auxiliary eyeglass to conventional eyeglasses. In one
16 embodiment, magnets having an orientation such that their
17 maximum magnetic force is vertical or parallel with conventional
18 eyeglass frame is sufficient to hold the auxiliary eyeglasses
19 securely on the conventional eyeglasses.

20 In another less preferred embodiment a clip is attached to
21 or integrally formed on the bridge of the auxiliary eyeglass
22 frame for fitting over and securing the auxiliary eyeglasses to
23 the bridge of the conventional eyeglasses.

24 In yet a third but less preferred embodiment a combination
25 of clips and magnets are employed to mount auxiliary eyeglasses
26 on conventional eyeglasses. In this third embodiment clips are

1 formed in an upper quadrant on the frame of the auxiliary
2 eyeglasses that fit over the frame of the conventional
3 eyeglasses. Magnets embedded in the bridge of the conventional
4 eyeglasses mate with magnets embedded in the bridge of the
5 auxiliary eyeglasses such as the auxiliary eyeglass bridge fits
6 beneath the conventional eyeglass bridge.

7 This invention is not to be limited by the embodiment shown
8 in the drawings and described in the description which is given
9 by way of example and not of limitation, but only in accordance
10 with the scope of the appended claims.
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